REMARKS

Claims 1-12 were examined. All claims were rejected. In response to the above-identified Office Action, Applicants amend claim 1, but do not cancel any claims or add any new claims. Reconsideration of the rejected claims in light of the aforementioned amendment and the following remarks is requested.

I. Objection to the Specification

The Examiner objected to the specification as failing to provide support for certain subject matter in claim 1. Applicants believe the Examiner may have been confused by the description of bottom electrode 230, which is composed of a first bottom electrode 230A and a second bottom electrode 230B (*see* Specification at p. 8, line 26 through p. 9, line 25 and Figs. 2B-2E). To reduce the potential for misunderstanding, Applicants propose amending the specification to refer to the two-part "bottom electrode" as a "*composite* bottom electrode." This will facilitate distinguishing between the first bottom electrode, the second bottom electrode, and the structure that is the combination of those two electrodes. It is respectfully submitted that the amendment improves the clarity of the description without adding new material. Applicants have also amended claim 1 to bring its terms into agreement with the terminology used in the specification. Withdrawal of this objection is respectfully requested.

II. Claims Rejected Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-6 and 9 under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 5,786,259 issued to Kang ("*Kang '259*") in view of U.S. Patent No. 5,834,357 also issued to Kang ("*Kang '357*"). Applicants believe that the cited references fail to teach or suggest all the limitations of the rejected claims.

As to claim 1, that claim recites a method of manufacturing a ferroelectric random access memory (FeRAM) capacitor, comprising a number of steps, including forming conductive oxides on exposed sidewalls of the first bottom electrode by carrying out an oxidation process. The Examiner concedes that the primary reference, *Kang '259*, fails to teach this step, but relies on *Kang '357* to provide the missing information. Unfortunately, although *Kang '357* is from the same field of endeavor when broadly defined as "semiconductor fabrication," one of ordinary skill would have

been extremely unlikely to attempt to combine *Kang '357* with *Kang '259* to accomplish the specific task of FeRAM capacitor construction. This is because *Kang '357* creates its finned ruthenium (Ru) / ruthenium oxide (RuO_2) bottom electrode to increase the capacitor's surface area (and therefore its capacitance), not to improve adhesion between the bottom electrode and a dielectric layer composed of a ferroelectric material. Also, *Kang '357* only succeeds in increasing capacitance if both the dielectric and second electrode are applied conformally to the finned bottom electrode (*see* Fig. 8, element 118, and col. 6, lines 35-45). If *Kang '357*'s finned lower electrode were formed in place of *Kang '259*'s lower electrode (elements 213 and 215 in Figs. 15-18), then *Kang '357*'s purpose would be achieved only if *Kang '259*'s dielectric 221 and its second conductive layer 223 could be applied conformally. Neither reference suggests that this might be possible.

Furthermore, *Kang '357*'s finned electrodes can only be formed if the sides of the patterned Ru/RuO_2 stack (Fig. 5, 82a/84a/82b/84b/82c) are accessible to the aqua regia or other etchant (*see* col. 6, lines 4-14). Thus, as applied to *Kang '259*, the electrodes would have to be formed *before* the application of the second insulating layer (Fig. 14, element 219). If the second insulating layer was applied after the fins were formed, then the finned electrodes would be mere ornaments embedded in the second insulating layer, achieving neither increased capacitance nor improved adhesion.

For at least these reasons, Applicants respectfully submit that not only would one of ordinary skill be unlikely to combine *Kang '259* with *Kang '357* for lack of a reasonable expectation of success, he would *in fact* enjoy no success for his trouble. Therefore, the Examiner is requested to withdraw the rejection of claim 1.

As to claims 2-6 and 9, those claims depend upon claim 1, which was shown to be patentable over the references of record in the preceding discussion. For at least the reasons discussed there, Applicants respectfully request that these rejections be withdrawn also.

The Examiner rejected claims 7 and 8 under 35 U.S.C. § 103(a) as unpatentable over *Kang '259* and *Kang '357* (*supra*), and further in view of U.S. Patent No. 6,080,592 to Paz de Araujo *et al.* ("*Paz de Araujo*"). Claims 7 and 8 depend upon claim 6 and ultimately upon claim 1. These base claims were discussed previously and shown to be patentable over *Kang '259* and *Kang '357*, and the Examiner relies upon *Paz de Araujo* only for its alleged teaching of forming a ferroelectric material that has a layered

perovskite crystal structure. Applicants have been unable to locate in the cited sections or elsewhere in *Paz de Araujo* of the limitation of claim 1 incorporated in claims 7 and 8: forming conductive oxides on exposed sidewalls of the first bottom electrode by carrying out an oxidation process. It is respectfully submitted the cited references fail to teach or suggest at least this limitation, and Applicants request the withdrawal of these rejections.

The Examiner rejected claims 10 and 11 under 35 U.S.C. § 103(a) as unpatentable over *Kang '259* and *Kang '357* (*supra*), and further in view of U.S. Patent No. 6,211,035 issued to Moise *et al.* ("*Moise*"). Claims 10 and 11 depend directly or indirectly upon claim 1, and incorporate all the limitations of that base claim. As previously discussed, *Kang '259* and *Kang '357* fail to teach at least the operation of forming conductive oxides on exposed sidewalls of the first bottom electrode by carrying out an oxidation process, and *Moise* fails to supply the missing information. Thus, even assuming for the sake of argument that *Moise* teaches carrying out an oxidation process by using a plasma gas, as claim 10 recites, or under the specific conditions as recited in claim 11, these claims are allowable because of the unanticipated limitation of claim 1. Applicants respectfully request that the rejections of these claims be withdrawn.

The Examiner rejected claim 12 under 35 U.S.C. § 103(a) as unpatentable over *Kang '259* and *Kang '357* (*supra*), and further in view of U.S. Patent No. 5,030,3331 issued to Sato ("*Sato*"). Claim 12 depends on claim 1, and incorporates therefrom the limitation previously discussed. *Sato* is only relied upon for teaching an oxidation process carried out through an annealing process in an ambient of a gas selected from the group consisting of O_2, N_2 and a combination thereof, at a temperature ranging from about 200° C to about 600° C, and Applicants have not discovered any suggestion in *Sato* of performing the process to form conductive oxides on exposed sidewalls of the first bottom electrode. Therefore, Applicants believe the references of record fail to teach or suggest all of the limitations of claim 12, and respectfully request that its rejection be withdrawn.

CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely claims 1-12, patentably define the subject invention over the prior art of record, and are in condition for allowance and such action is earnestly solicited at the earliest possible date. If the Examiner believes that a telephone conference would be useful in moving the application forward to allowance, the Examiner is encouraged to contact the undersigned at (310) 207-3800.

Dated: 1/5, 2005

Respectfully submitted,
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Melissa Stead Jaunary 5, 2005